

**U.S. FISH AND WILDLIFE SERVICE  
SPECIES ASSESSMENT AND LISTING PRIORITY ASSIGNMENT FORM**

SCIENTIFIC NAME: Noturus crypticus

COMMON NAME: chucky madtom

LEAD REGION: 4

INFORMATION CURRENT AS OF: October 2005

**STATUS/ACTION:**

☐ Species assessment - determined species did not meet the definition of endangered or threatened under the Act and, therefore, was not elevated to Candidate status

☐ New candidate

☒ Continuing candidate

☐ Non-petitioned

☒ Petitioned - Date petition received: May 11, 2004

☐ 90-day positive - FR date:

☐ 12-month warranted but precluded - FR date:

☐ Did the petition request a reclassification of a listed species?

**FOR PETITIONED CANDIDATE SPECIES:**

a. Is listing warranted (if yes, see summary of threats below)? yes

b. To date, has publication of a proposal to list been precluded by other higher priority listing actions? yes

c. If the answer to a. and b. is "yes", provide an explanation of why the action is precluded. We find that the immediate issuance of a proposed rule and timely promulgation of a final rule for this species has been, for the preceding 12 months, and continues to be, precluded by higher priority listing actions (including candidate species with lower LPNs). During the past 12 months, most of our national listing budget has been consumed by work on various listing actions to comply with court orders and court-approved settlement agreements, meeting statutory deadlines for petition findings or listing determinations, emergency listing evaluations and determinations, and essential litigation-related, administrative, and program management tasks. We will continue to monitor the status of this species as new information becomes available. This review will determine if a change in status is warranted, including the need to make prompt use of emergency listing procedures. For information on listing actions taken over the past 12 months, see the discussion of "Progress on Revising the Lists," in the current CNOR which can be viewed on our Internet website (<http://endangered.fws.gov/>).

☐ Listing priority change

Former LP: ☐

New LP: ☐

Date when the species first became a Candidate (as currently defined): June 13, 2002

Chucky madtom (*Noturus crypticus*) Candidate Form October 2005

\_\_\_ Candidate removal: Former LPN: \_\_\_

\_\_\_ A - Taxon is more abundant or widespread than previously believed or not subject to the degree of threats sufficient to warrant issuance of a proposed listing or continuance of candidate status.

\_\_\_ U - Taxon not subject to the degree of threats sufficient to warrant issuance of a proposed listing or continuance of candidate status due, in part or totally, to conservation efforts that remove or reduce the threats to the species.

\_\_\_ F - Range is no longer a U.S. territory.

\_\_\_ I - Insufficient information exists on biological vulnerability and threats to support listing.

\_\_\_ M - Taxon mistakenly included in past notice of review.

\_\_\_ N - Taxon may not meet the Act's definition of "species."

\_\_\_ X - Taxon believed to be extinct.

ANIMAL/PLANT GROUP AND FAMILY: Fishes - Ictaluridae

HISTORICAL STATES/TERRITORIES/COUNTRIES OF OCCURRENCE: Tennessee

CURRENT STATES/ COUNTIES/TERRITORIES/COUNTRIES OF OCCURRENCE: Greene County, Tennessee

LAND OWNERSHIP: The Little Chucky Creek watershed is primarily owned by private entities with the exception of small government land holdings such as public school properties and county and state road right-of-ways. Approximately 5 percent of the Dunn Creek watershed is owned by the National Park Service (i.e., portions of the Great Smoky Mountains National Park and Foothills Parkway), but the Dunn Creek watershed is also primarily in private ownership.

LEAD REGION CONTACT: Richard Gooch, 404/679-7124

LEAD FIELD OFFICE CONTACT: Cookeville, Tennessee, Field Office, Geoff Call, 931/528-6481, extension 213

#### BIOLOGICAL INFORMATION:

##### Description

This information is summarized from Burr et al. (2005). The chucky madtom is a small catfish, with the largest specimen measuring 64.7 mm SL (74 mm TL). A robust madtom, the chucky madtom body is wide at the pectoral fin origins, greater than 23% SL. Head is wide and flattened dorsally; pectoral and dorsal fin short and rounded; adipose fin low and well-connected to caudal fin. Pectoral spine is relatively short, stout, and slightly curved with 6-8 recurved posterior serrae and numerous, fine, distinct, anterior serrae. Sexual dimorphism apparent only in a pair of specimens collected 1 May; the male has enlarged epaxial muscles immediately posterior to the head and the female has a distended abdomen.

Chucky madtom (*Noturus crypticus*) Candidate Form October 2005

The most distinctive pigmentation of the chunky madtom is on the cheek, dorsum, and fins. Two to 10 medium-sized melanophores are present on the cheek below and behind the eye. Otherwise head is pale on the venter and sides and dark on the dorsum, with an extension of dark pigmentation about halfway down operculum. Dorsum contains three dark, nearly black blotches ending abruptly above the lateral midline of the body, with a moderately contrasting, oval, pale saddle anterior to each blotch. The first blotch is at the dorsal fin, the second blotch is immediately anterior to the leading edge of the adipose fin, and the third blotch is at the middle base of the adipose fin. Pigmentation along the sides is moderately intense and slightly concentrated along the myosepta, creating faint chevrons. The belly anterior to the pelvic fins lacks melanophores. Pigmentation at the posterior dark dorsal saddle extends about midway up the adipose fin. Three broad, evenly spaced, pale and dark contrasting bands are present on the caudal fin, which has a clear, narrow marginal band. The anal fin is typically clear, though dark pigmentation may be present on the middle portions of the rays. Pelvic fins are clear and pectoral fins mostly clear, with dark pigment on the spine and the middle portions of the first 2-3 rays.

### Taxonomy

Burr et al. (2005) described the chunky madtom, confirming previous meristic, allozyme, and morphometric analyses (Burr and Eisenhour 1994, Eisenhour et al. 1995), which indicated that the chunky madtom is a unique species, a member of the Rabida subgenus (i.e., the “mottled” or “saddled” madtoms), and a member of the Noturus elegans species complex (i.e., N. elegans, N. albater, and N. trautmani) ascribed by Taylor (1969 in Grady and LeGrande 1992).

Recognition of chunky madtom as a distinct species is further supported by analyses of patterns of nucleotide variation in cytochrome *b* sequences in the genus Noturus (Thomas J. Near, University of Tennessee; Michael Hardman, Finnish Forest Research Institute in litt. 2005). However, these analyses resolved N. crypticus as a member of the hildebrandi clade, which included from the elegans group only the nominate species; though N. trautmani apparently was not included in their analyses. Other taxa included in the hildebrandi clade were N. stanauli, N. fasciatus, N. baileyi, and a paraphyletic N. hildebrandi. The N. albater species complex was recognized as a sister taxon, albeit poorly resolved, to the hildebrandi clade (Thomas J. Near, University of Tennessee; Michael Hardman, Finnish Forest Research Institute in litt. 2005).

The following characteristics distinguish the chunky madtom from other members of the elegans species group: 1) modally 16 anal rays, 2) modally 8 pelvic rays, 3) 2-10 medium-large sized melanophores on the cheek, 4) adipose fin band extending only to base or half-way up fin, 5) adipose and caudal fins distinctly joined at their juncture, 6) three evenly spaced pale and dark bands in caudal fin, and 7) robust body shape, with body width at pectoral fin origin 23% or more of SL and greater than anal fin base length. The smoky madtom (N. baileyi), which is the only other member of the hildebrandi clade (Thomas J. Near, University of Tennessee; Michael Hardman, Finnish Forest Research Institute in litt. 2005) known from eastern Tennessee, differs from the chunky madtom in having a shorter anal fin with only 12-13 anal rays, nearly lacking anterior serrae on the pectoral fin spines, and in nearly lacking dorsal saddles (Burr et al. 2005).

Originally, museum specimens collected from the Roaring River (a Cumberland River drainage) and from the Paint Rock River system in Alabama (a Tennessee River tributary well downstream of the Nolichucky and Little Pigeon River sites) were tentatively identified and catalogued as Noturus elegans and thought to be chunky madtoms. The Roaring River specimens are now tentatively considered to be a member of the Noturus elegans group, but have not been assigned to species. While the specimens from the Paint Rock River system share typical anal ray counts with the chunky madtom, they lack the distinctive cheek melanophores, differ in pelvic ray counts, and are intermediate between the chunky and saddled madtoms with respect to body width as a proportion of SL (Burr *et al.* 2005). Thus, the Little Chunky and Dunn Creek forms are the only forms that are recognized as chunky madtoms.

### Habitat

All of the specimens collected in Little Chunky Creek have been found in stream runs with slow to moderate current over pea gravel, cobble, or slab-rock substrates (Burr and Eisenhour 1994). Habitat of these types is sparse in Little Chunky Creek, and the stream affords little loose, rocky cover suitable for madtoms (Shute *et al.* 1997). It is notable that an intact riparian buffer occurs in the locations where chunky madtoms have been found (Shute *et al.* 1997). Intact riparian buffers may be required by the species.

### Life History

Studies to determine the life history and behavior of this species have not been conducted. While nothing is known specifically about chunky madtom reproductive biology, recruitment, growth and longevity, food habits, or mobility, available information for other members of the N. hildebrandi clade and a sister taxon, N. albater (Thomas J. Near, University of Tennessee; Michael Hardman, Finnish Forest Research Institute *in litt.* 2005), is summarized below. The following information is summarized from Etnier and Jenkins (1980) for N. stanauli, Burr and Dimmick (1981) for N. elegans, Mayden and Walsh (1984) for N. hildebrandi, Dinkins and Shute (1996) for N. baileyi, and Mayden *et al.* (1980) for N. albater.

*Reproductive biology* – N. baileyi and N. hildebrandi both may reach sexual maturity at 1+ years of age (i.e., during their second summer). Only the largest 1+ year females of N. albater were found to be sexually mature, and males were found to be sexually mature primarily in the 2+ age class. Though, a single large male of the 1+ age class showed evidence of sexual maturity. The breeding season in hildebrandi and baileyi was primarily during June through July, though development of breeding condition was initiated as early as April in hildebrandi and May in baileyi. Spawning in albater was thought to occur from late June through July, based on spawning dates for other Noturus occurring at the same latitude. While the spawning period was not known for elegans, three nests were collected on June 22, 1980. Two of these contained fry larvae and the third contained two masses of eggs. Fecundity varied among the species for which data were available; values found in the literature are reported in Table 1. It should be noted that fecundity in madtoms is generally lower in comparison to other North American freshwater fishes (Breder and Rosen 1966 *in* Dinkins and Shute 1996). Dinkins and Shute

(1996) commented that the combination of relatively large egg size and high level of parental care given to the fertilized eggs and larvae reduce early mortality and therefore the need to produce a large number of gametes.

**Table 1. Fecundity data for four species of Noturus.**

Specific epithet	eggs per nest	mature ova per individual
<u>albater</u>	42	~112
<u>baileyi</u>	~35	~55
<u>elegans</u>	~25	~31
<u>hildebrandi</u>	~19	~30

Anecdotal evidence of polyandry has been observed in both hildebrandi and baileyi. Mayden and Walsh (1984) found one partially spent female hildebrandi and, based on a linear regression model they developed relating size to egg production, estimated that she had retained approximately half of the mature oocytes produced. They also found the number of embryos in aquarium nests to be about half the number of oocytes produced by females. Dinkins and Shute (1996) observed a partially spent gravid baileyi female, approximately one meter from a nest containing 33 eggs that was guarded by a single madtom, with several eggs protruding from her urogenital opening. On another occasion they observed a single male guarding a nest comprised of two distinct age classes. While not conclusive, these observations suggest that polyandry might be exhibited in Noturus reproductive behavior.

*Nesting behavior* – Of the five madtoms for which literature were reviewed to glean information on life history traits in Noturus, elegans, baileyi, and stanauli occur in the same broad geographic region and in similar habitats to crypticus. No data were available on nesting behavior in stanauli; however, both baileyi and elegans were found to nest under flat rocks at or near the head of riffles. Shallow pools were also used by baileyi, which was observed to select rocks of larger dimension for nesting than were used for shelter during other times of year. Single madtoms were found to guard nests in baileyi and elegans, behavior also exhibited by albater and hildebrandi. Males of these species were the nest guardians and many were found to have empty stomachs suggesting that they do not feed while guarding nests, which can last as long as three weeks.

*Sexual dimorphism* – in the form of enlarged head musculature of breeding males was observed in albater, hildebrandi, and baileyi. Similar dimorphism was also observed between a single pair of specimens examined in describing the chunky madtom (Burr *et al.* 2005).

*Growth and longevity* – Data for hildebrandi, baileyi, and elegans indicate that larval madtoms in the hildebrandi clade assume many of the characteristics of adults and absorb most of their egg sacs within about 12 days of hatching. However, a consistent observation was that the barred color pattern typical of adults does not develop until later, a trait also observed in albater. The only members of this clade for which longevity data were available were hildebrandi and baileyi. The shorter-lived of these, hildebrandi reached a maximum age of 18 months, though most individuals lived little more than 12 months, dying soon after spawning. Based on length-

frequency distributions, baileyi exhibited a lifespan of two years, with two cohorts present in a given year. Collection of two age classes together provided evidence that life expectancy exceeds one year in stanauli. Dinkins and Shute (1996) remarked that hildebrandi, baileyi, and stanauli are the shortest-lived madtoms. The sister taxon to the hildebrandi clade, albater, lived as long as three years. Maximum lengths reported were 51.6 mm SL and 48.6 mm SL in female and male hildebrandi, respectively, 68.9 mm SL in baileyi, and 89 mm SL in albater.

*Food habits* – Invertebrate taxa formed the primary food base for madtoms. Chironomid, trichopteran, plecopteran, and ephemeropteran larvae were frequently encountered in stomach contents of hildebrandi. In baileyi ephemeropteran nymphs comprised 70.7 percent of stomach contents analyzed, dipterans 2.4 percent, trichopterans 4.4 percent, and plecopterans 1.0 percent. Significant daytime feeding was observed in baileyi. In stomachs sampled solely from night collections, which were consistently full and showed little evidence of digestion, 95.7 percent of albater diet was comprised of aquatic insects. Dipterans accounted for 70 percent of food items and were present in 95 percent of stomachs examined.

*Mobility* – The only data on mobility were for baileyi, which were found underneath slabrocks in swift to moderate current during May to early November. Habitat use shifted to shallow pools over the course of a one-week period, coinciding with a drop in water temp to 7-8°C, and persisted from early November to May.

#### Historical Range/Distribution

The chunky madtom is a rare, undescribed catfish known from only 15 specimens collected from two Tennessee streams. A lone individual was collected in 1940 from Dunn Creek (a Little Pigeon River tributary) in Sevier County and 14 specimens have been encountered since 1991 in Little Chucky Creek (a Nolichucky River tributary) in Greene County. Only 3 specimens have been encountered since 1994, one in 2000 (Lang *et al.* 2001) and two in 2004 (Chris Cooper, Tennessee Valley Authority, pers. comm. 2004). This despite numerous surveys of both historic localities and several streams, similar in size and character to Little Chucky Creek, in the Nolichucky, Holston, and French Broad River watersheds of the upper Tennessee River basin (Burr and Eisenhour 1994, Shute *et al.* 1997, Lang *et al.* 2001, Rakes *et al.* 2004). The species is apparently very rare and geographically restricted.

#### Current Range/Distribution

This species is currently believed to be restricted to an approximately 3-km reach of Little Chucky Creek, a third order tributary of the Nolichucky River that drains a portion of the Ridge and Valley physiographic province.

#### Population Estimates/Status

Due to low numbers and the sporadic collections of chunky madtom specimens, it is not possible to estimate the population size of this species or to elucidate trends in status.

## THREATS:

### A. The present or threatened destruction, modification, or curtailment of its habitat or range.

The current range of the chucky madtom is believed to be restricted to an approximately 3-km reach of Little Chucky Creek in Greene County, Tennessee. Because this species was also collected from Dunn Creek, a stream that is in a different watershed and physiographic province than Little Chucky Creek, it is likely that the historic range of the chucky madtom encompassed a wider area in the Ridge and Valley and Blue Ridge physiographic provinces in Tennessee than is demonstrated by its current distribution. A survey for the chucky madtom in Dunn Creek in 1996 was not successful at locating the species (Shute *et al.*, 1997), and approximately ten additional collections from the Dunn Creek site, during both daylight hours and at night, from the 1970s through 2001, also failed to produce chucky madtoms (David Etnier, University of Tennessee, pers. comm. 2001). The Dunn Creek population may be extirpated. The very small current range of the species leaves it vulnerable to stochastic events that may extirpate it from the only creek that it occupies (also see Factor E).

The chucky madtom is a bottom dwelling species. Bottom dwelling fish species are susceptible to sedimentation and other pollutants that degrade or eliminate habitat and food sources (Berkman and Rabeni 1987; Folkerts 1997; Richter *et al.* 1996; Waters 1995). Etnier and Jenkins (1980) suggested that madtoms, which are heavily dependent on chemoreception for survival, might be susceptible to anthropogenic disturbances, such as chemical and sediment inputs, because the olfactory noise they produce could interfere with a madtom's ability to obtain food and otherwise monitor its environment.

The Greene County Soil Survey (USDA 1958) reported the majority of land in Greene County was privately owned and managed for beef cattle production, tobacco cultivation, and row crops, especially corn and soybeans. Land use data from Tennessee GAP analysis (Jones *et al.* 2000) were used to establish a baseline of land use patterns solely within the Little Chucky Creek watershed ca. 1993, which is presented in Table 2. While these data confirm the largely agricultural use of land both throughout the watershed and within 100 meters of Little Chucky Creek and its tributaries, they demonstrate that the vast majority of agricultural land is devoted to production of livestock and their forage base. Another important fact is that forested and agricultural lands combined comprised about 98 percent of land in the watershed and within 100 meters of streams in the watershed.

**Table 2. Area and percentage of landuses in Little Chucky Creek watershed and within 100-m buffer of streams in the watershed, as determined using Tennessee Gap Analysis land cover dataset.**

Landuse Class	Acres		Hectares		Percent	
	w/in 100 m	total	w/in 100 m	total	w/in 100 m	total
Open Water	11.60	13.43	4.69	5.43	0.19	0.05
Forested Wetland	10.45	24.65	4.23	9.98	0.17	0.09
Nonforested Wetland	1.70	2.46	0.69	1.00	0.03	0.01
Pasture/Grassland	4141.12	17693.43	1675.85	7160.28	66.98	62.88
Row Crop	271.75	1031.13	109.97	417.28	4.40	3.66

Upland Deciduous Forest	1301.95	7363.19	526.88	2979.78	21.06	26.17
Upland Mixed Forest	229.52	932.96	92.88	377.56	3.71	3.32
Upland Coniferous Forest	90.53	566.13	36.64	229.10	1.46	2.01
Urban/Developed	124.39	509.74	50.34	206.28	2.01	1.81
<b>Grand Total</b>	<b>6183.01</b>	<b>28137.12</b>	<b>2502.18</b>	<b>11386.69</b>	<b>100.00</b>	<b>100.00</b>

Given the predominantly agricultural landuse within the Little Chucky Creek watershed, nonpoint source sediment and agrochemical runoff could pose a threat to the chucky madtom by altering the physical characteristics of its habitat, thus potentially impeding its ability to feed, seek shelter from predators, and successfully reproduce. The Little Chucky Creek watershed also contains a portion of the city of Greeneville, providing an additional source for input of sediments and contaminants into the creek.

Agricultural practices are also common in the Dunn Creek watershed and could continue to threaten the species if it still occurs there. Additional threats within the Dunn Creek watershed include residential development and associated new infrastructure (e.g., roads, utilities, etc.) that contribute sediment and other pollutants to the stream or alter riparian areas. The effects of these types of threats will likely increase as human populations grow in these watersheds in response to human demands for housing, transportation, and places of employment. In particular, the areas surrounding Dunn Creek are becoming developed for new residential and vacation homes due to its proximity to the Great Smoky Mountains National Park and other area attractions.

B. Overutilization for commercial, recreational, scientific, or educational purposes.

This species is known from only 15 collected specimens. Because of the chucky madtom's extreme rarity and restricted range, scientific or commercial collection of even a few individuals could be detrimental to the species. The release of locality information for the species could also increase the risk of over-collection.

C. Disease or predation.

Various predators, including birds, snakes, and other fish, undoubtedly consume chucky madtoms. No predation studies have been performed on this species, but, because the chucky madtom is presumed to be extremely rare, even natural predation could adversely effect any extant population. Dinkins and Shute (1996) observed apparent predation of eggs from N. baileyi nests abandoned by the single guardian. No diseases are known to affect the species.

D. The inadequacy of existing regulatory mechanisms.

The federally endangered Cumberland bean (Villosa trabalis) is still believed to exist in the western section of Little Chucky Creek, Greene County, Tennessee (Steve Ahlstedt, USGS, pers. comm. 2002). Historic records of the Cumberland bean have been documented in Little Chucky Creek upstream of the locations from which chucky madtoms have been collected. The chucky madtom should, therefore, receive incidental protection under the federal Endangered Species

Act. Federal listing would provide additional protection for this species by (1) requiring federal endangered species permits to take or collect this species and (2) requiring federal agencies to consult with the Service when projects they fund, authorize, or carry out may adversely affect the species. The chucky madtom was listed as Endangered by the State of Tennessee in September of 2000. Potential collectors of this species would be required to have a state collection permit.

E. Other natural or manmade factor affecting its continued existence.

The chucky madtom is apparently restricted to a short reach of Little Chucky Creek, Greene County, Tennessee, and is, therefore, extremely vulnerable to extirpation from vandalism or random catastrophic events such as toxic chemical spills. Species that are restricted in range and population size are also susceptible to inbreeding depression and genetic bottlenecks (Avisé and Hambrick, 1996). The low fecundity rates exhibited by many madtom catfishes (Breder and Rosen 1966 in Dinkins and Shute 1996) could limit potential for populations to rebound from disturbance events that severely reduce population size. It is possible that the only extant population of chucky madtoms is below the effective population size (Soulé 1980) required to maintain long-term genetic and population viability. The short life span exhibited by members of the hildebrandi clade of madtoms, if also true of chucky madtoms, would further limit the species' viability by rendering it vulnerable to severe demographic shifts from disturbances that prevent reproduction in even a single year, much less successive years. Overall, the Service believes that the potential demographic effects of inbreeding, limited species distribution, low fecundity, short life span, and presumed low number of individuals pose the most significant threats to the chucky madtom.

CONSERVATION MEASURES PLANNED OR IMPLEMENTED:

The Middle Nolichucky Watershed Alliance (MNSWA) serves as a coordinating body for conservation and outreach efforts throughout the Middle Nolichucky watershed, of which Little Chucky Creek is a part. In 2005, the MNSWA established a Technical Advisory Committee comprised of federal, state, and local governmental agency and nongovernmental organization representatives. The Technical Advisory Committee selected the Little Chucky Creek drainage as the focal region for its initial efforts in the watershed. This committee will build on conservation efforts described below and assume a leadership role in establishing conservation priorities, seeking funding for conservation measures, and implementing and monitoring the effectiveness of those measures. Conservation efforts in the Little Chucky Watershed to date are described below in two broad categories: 1) general habitat conservation to protect water quality by encouraging sound land use practices, and 2) specific measures to determine distribution and status of chucky madtoms, generate knowledge regarding the species biology, or propagate chucky madtoms for population augmentation.

Habitat Conservation

Numerous partners are cooperating in efforts to implement agricultural best management practices in Little Chucky Creek watershed by delivering various incentive programs to private

landowners. These partners include the Greene County Soil Conservation District, USDA-Natural Resources Conservation Service (NRCS), Tennessee Valley Authority, Tennessee Wildlife Resources Agency (TWRA), and the Service.

The Service has completed five Partners for Fish and Wildlife projects along Little Chucky Creek, which have involved matching funds from Tennessee Valley Authority (TVA) and technical assistance from Greene County Soil Conservation District and NRCS. A sixth project has been identified and funding obligated for completion during the 2006 fiscal year. These projects involve installation of riparian fencing, creation of alternate water sources and development of hardened stream access points for cattle, and bank stabilization. Partners for Fish and Wildlife funds are sought annually for new habitat restoration projects in the watershed.

The Greene County Soil Conservation District and NRCS staff have been instrumental not only in helping the Service to deliver Partners for Fish and Wildlife programs in the Little Chucky Creek watershed, but also in delivering other conservation programs, including: Environmental Quality Incentives Program (EQIP), Tennessee Department of Agriculture's Agriculture Resource Conservation Fund (ARCF), and the Tennessee Landowner Incentive Program (LIP). A total of nine projects, in addition to the Partners for Fish and Wildlife projects, have been completed in the watershed with funding from these programs or through voluntary efforts of landowners who were initially targeted for government funding sources but ultimately declined financial assistance. Three additional projects have been identified; funding for two has been approved through the LIP, which is funded by the Service and administered by TWRA.

#### Specific Chucky Madtom Conservation Measures

Four surveys for chucky madtoms were completed during 1993-2003 (Burr and Eisenhour 1994, Shute *et al.* 1997, Lang *et al.* 2001, Rakes *et al.* 2004). The TWRA funded the initial survey for chucky madtoms, following collection of two specimens in Little Chucky Creek by Charles Saylor, a TVA biologist, in 1991. Burr and Eisenhour (1994) sampled 14 sites in addition to five Little Chucky Creek sites during this survey, including streams in the Ridge and Valley and Blue Ridge physiographic provinces in Cocke, Greene, Hamblen, Unicoi, and Washington counties. Sampled streams were tributaries to either the Nolichucky (13 sites and Little Chucky Creek) or the French Broad (one site) rivers. This survey produced nine specimens of chucky madtom, four of which were taken from the same riffle habitat where they were found by TVA in 1991. An additional five specimens were taken from a new location at the mouth of Jackson Branch, a tributary to Little Chucky Creek, approximately 3 km upstream from the locality where the four specimens were collected and in similar habitat.

The TWRA funded a second survey (Shute *et al.* 1997) that included the 19 sites surveyed by Burr and Eisenhour (1994) and an additional 35 sites that were reconnoitered and surveyed if suitable habitat was observed. This survey was completed during 1995-1996 and added streams in the Holston River system, which were chosen for their apparent similarity to Little Chucky Creek with respect to stream size and physiography. This survey employed both seining and snorkeling, but did not produce any chucky madtom specimens. In response to the collection of a single specimen in 2000 at the locality where TVA first collected chucky madtoms in Little

Chucky Creek, the Service funded a third survey, completed between February and September 2001, that encompassed 36 sites in the middle and upper Tennessee River drainage but failed to produce chucky madtom specimens (Lang et al. 2001).

The Service's Candidate Conservation Program provided funding for a fourth survey for chucky madtoms in Little Chucky Creek and to collect individuals to initiate a captive propagation program. Fifteen surveys conducted by Conservation Fisheries, Inc. (CFI), between June 13, 2002 and December 5, 2003, totaling 134 person-hours of instream effort, were unsuccessful at relocating any specimens of the chucky madtom (Rakes and Shute 2004). Two additional collection efforts in Little chucky Creek were conducted by personnel from the Service, TVA, TWRA, CFI, the Izaak Walton League, and the University of Tennessee on two separate days during the spring of 2004. Two individuals were collected during the first of these two efforts and transported to CFI's facility in Knoxville, Tennessee, for the purpose of initiating a captive propagation program. The collections were taken from a riffle habitat where specimens had not previously been collected. One of these specimens died during 2004, leaving a single live specimen in captivity at CFI.

The Service and USGS secured funds during 2005 for an ongoing survey, which is focused on tributaries and headwater reaches of Little Chucky Creek – areas not investigated during previous surveys. The focus on tributaries and headwaters was selected due to unconfirmed reports of two madtoms collected during a TWRA spill investigation in 1973 in a tributary to Little Chucky Creek near the town of Rader. Any specimens collected during this survey will be transported to CFI for propagation.

#### SUMMARY OF THREATS:

Threats to the chucky madtom include both extrinsic and intrinsic factors. Extrinsic factors include potential degradation of water quality and breeding and sheltering habitat due primarily to agricultural landuse practices and secondarily to urban and rural development in the watersheds of Little Chucky and Dunn creeks. Intrinsic factors include the presumed low population level evidenced by few collections of chucky madtoms despite numerous surveys for this species, potential for deleterious effects of inbreeding in small populations, and low fecundity and short lifespan exhibited by closely related madtom species and presumably shared by the chucky madtom.

For species that are being removed from candidate status:

\_\_\_ Is the removal based in whole or in part on one or more individual conservation efforts that you determined met the standards in the Policy for Evaluation of Conservation Efforts When Making Listing Decisions (PECE)?

#### RECOMMENDED CONSERVATION MEASURES:

#### LISTING PRIORITY:

THREAT			
Magnitude	Immediacy	Taxonomy	Priority
<b>High</b>	<b>Imminent</b>	Monotypic genus	1
		<b>Species</b>	<b>2*</b>
	Non-imminent	Subspecies/population	3
		Monotypic genus	4
		Species	5
Moderate to Low	Imminent	Subspecies/population	6
		Monotypic genus	7
		Species	8
	Non-imminent	Subspecies/population	9
		Monotypic genus	10
		Species	11
		Subspecies/population	12

Rationale for listing priority number:

*Magnitude:* This taxon is known from only 14 specimens in two streams in eastern Tennessee. Only 13 of these specimens were taken relatively recently (since 1985) and they were all taken from Little Chucky Creek in Greene County, Tennessee. Chucky madtoms have been collected from Little Chucky Creek only one time (two individuals) since 2000 despite intensive survey efforts.

*Imminence:* We believe that this species should receive a Listing Priority Number of 2 to reflect the imminent, extremely high level of threat (due to small population size and ongoing land use practices that threaten this species) that this species faces in Little Chucky Creek.

Rationale for Change in Listing Priority Number (insert if appropriate): N/A

Yes Have you promptly reviewed all of the information received regarding the species for the purpose of determining whether emergency listing is needed?

Is Emergency Listing Warranted? No, we believe that emergency listing of the chucky madtom is not warranted at this time for several reasons. First is the recent confirmation of an extant population of this species in Little Chucky Creek. The two individuals collected during the spring of 2004 were found in a riffle in Little Chucky Creek from which specimens were not previously known. This riffle is located a few hundred meters upstream of the previously highest known collection site in the drainage (Patrick Rakes, CFI, pers. comm. 2004), lengthening the reach of the creek from which the species was known to occur. Second, the USGS is conducting surveys during 2005 and 2006, with the goal of providing specimens to CFI to continue efforts to propagate chucky madtoms in captivity. Propagation was attempted with two specimens collected during 2004; however, only one of these fish remains alive in captivity at CFI. Finally, the Service is engaged in collaborative efforts with multiple partners and private Chucky madtom (*Noturus crypticus*) Candidate Form October 2005

landowners to abate threats associated with agricultural land uses in the Little Chucky Creek drainage by installing riparian fencing, creating alternate water sources and developing hardened stream access points for cattle, and stabilizing erosive stream banks. An emergency listing of this species would provide little extra statutory protection to the chucky madtom, owing to the presence of the federally listed Cumberland bean mussel in lower reaches of Little Chucky Creek.

#### DESCRIPTION OF MONITORING:

Because of the extreme rarity or low collection rate for this species, monitoring has been limited to the surveys and collection efforts described in the Conservation Measures Planned or Implemented section. Such monitoring involves conducting surveys to identify stream runs with slow to moderate current over pea gravel, cobble, or slab-rock substrates (Burr and Eisenhour 1994) in Little Chucky Creek. Collections have been attempted in these habitats by kick-seining or snorkeling. This level of monitoring is appropriate for this species due to the apparent rarity or low detection rates for this species, which prevents utilization of a sampling design that would permit detection of trends. The Service maintains contact with TVA biologists, who conduct periodic stream assessments and water quality monitoring in Little Chucky Creek. The Service also maintains contact with academic biologists working to resolve taxonomic questions for the Noturus elegans species complex, including: Brooks M. Burr (Southern Illinois University), James Grady (University of New Orleans), and David Eisenhour (Morehead State University).

#### COORDINATION WITH STATES:

Indicate which State(s) (within the range of the species) provided information or comments on the species or latest species assessment: The state of Tennessee (TWRA) was provided opportunities to comment on the form but did not respond.

Indicate which State(s) did not provide any information or comments: Tennessee

#### LITERATURE CITED:

##### Peer reviewed original research based on data

Berkman, H.E. and C.F. Rabeni. 1987. Effect of siltation on stream fish communities. *Environmental Biology of Fishes*. 18:285-294.

Burr, B. M., D. J. Eisenhour, and J. M. Grady. 2005. Two new species of Noturus (Siluriformes: Ictaluridae) from the Tennessee River drainage: description, distribution, and conservation status. *Copeia* 4:783-802.

Dinkins, G. R. and P. W. Shute. 1996. Life histories of Noturus baileyi and N. flavipinnis (Pisces:Ictaluridae), two rare madtom catfishes in Citico Creek, Monroe County, Tennessee. *Bulletin of the Alabama Museum of Natural History* 18:43-69.

Eisenhour, D. J., B. M. Burr, and J. M. Grady. 1995. Status and identification of the “chucky madtom,” Noturus (Rabida) sp. Association of Southeastern Biologists Bulletin 42:130.

Etnier, D. A. and R. E. Jenkins. 1980. Noturus stanauli, a new madtom catfish from the Clinch and Duck rivers, Tennessee. Bulletin of the Alabama Museum of Natural History 5:17-22.

Grady, J. M. and W. H. LeGrande. 1992. Phylogenetic relationships, modes of speciation, and historical biogeography of the madtom catfishes, genus Noturus Rafinesque (Siluriformes: Ictaluridae), pp. 747-777 in R. L. Mayden, ed. Systematics, historical ecology, and North American freshwater fishes. Stanford University Press, Stanford, California. 969 pp.

Mayden, R. L., B. M. Burr, and S. L. Dewey. 1980. Aspects of the life history of the Ozark madtom, Noturus albater, in Southeastern Missouri (Pisces:Ictaluridae). American Midland Naturalist 104:335-340.

Mayden, R. L. and S. J. Walsh. 1984. Life history of the least madtom Noturus hildebrandi (Siluriformes: Ictaluridae) with comparisons to related species. American Midland Naturalist 112:349-368.

Taylor, W. R. 1969. A revision of the catfish genus Noturus Rafinesque with an analysis of higher groups in the Ictaluridae. U.S. National Museum Bulletin 282:1-315.

#### Peer reviewed secondary research derived

Awise, J.C. and J.L. Hambrick, eds. 1996. Conservation Genetics: Case Histories from Nature. Chapman & Hall, N.Y.

Breder, C. M., Jr., and D. E. Rosen. 1966. Modes of reproduction in Fishes. Natural History Press, Garden City, New Jersey. 941 pp.

Folkerts, G.W. 1997. State and fate of the worlds aquatic fauna. pp. 1-16 In: Aquatic Fauna in Peril: The Southeastern Perspective, G.W. Benz and D.E. Collins (editors). Species Publication 1, Southeast Aquatic Research Institute, Lenz Design & Communications, Decatur, Georgia.

Richter, B.D., D.P. Braun, M.A. Mendelson, and L.L. Master. 1996. Threats to imperiled freshwater fauna. Conservation Biology. 11(5): 1081-1093.

Soulé, M.E. 1980. Threshold for survival: maintaining fitness and evolutionary potential. Pages 151-169 in: M.E. Soulé and B.A. Wilcox, eds. Conservation Biology. Sinauer Associates Inc., Sunderland, Massachusetts.

Waters, T.F. 1995. Sediment in streams: sources, biological effects, and control. Monograph #7. American Fisheries Society, Bethesda, Maryland, 251 pp.

Grey research based on data

Burr, B.M. and D.J. Eisenhour. 1994. Final report: status survey of the chucky madtom (Ictaluridae: Noturus sp.) in east Tennessee. Report submitted to Tennessee Wildlife Resources Agency, Nashville. 24 pp.

Jones, J. M., S. Marden, P. Miller, C. Whitehead, A. Gebhardt, and J.B. Layzer 2000. Tennessee Land Cover and metadata. Tennessee Gap Analysis Project, Tennessee Wildlife Resources Agency, Nashville, TN.

Lang, N.J., S.L. Powers, and R.L. Mayden. 2001. Status survey of the *Noturus elegans* species group in the middle and upper Tennessee River drainage. Report submitted to the U.S. Fish and Wildlife Service, Cookeville Field Office, Tennessee. 15 pp.

Rakes, P.L. and J.R. Shute. 2004. Surveys for the chucky madtom (Noturus sp., cf. elegans) in Little Chucky Creek, Greene County, Tennessee. Final Report submitted to the U.S. Fish and Wildlife Service, Cookeville Field Office, Tennessee. 8 pp.

Shute, P.W., P.L. Rakes, and J.R. Shute. 1997. Status survey of the chucky madtom (Noturus sp., cf. elegans). Final Report for Tennessee Wildlife Resources Agency, Contract No. GR-5-106052-6-01. 14 pp.

U.S. Department of Agriculture, Soil Conservation Service. 1958. Soil survey of Greene County, Tennessee. Series 1947, Number 7. U.S. Government Printing Office, Washington D.C., 89 pp.

APPROVAL/CONCURRENCE: Lead Regions must obtain written concurrence from all other Regions within the range of the species before recommending changes, including elevations or removals from candidate status and listing priority changes; the Regional Director must approve all such recommendations. The Director must concur on all resubmitted 12-month petition findings, additions or removal of species from candidate status, and listing priority changes.

Approve: /s/ Jeffrey M. Fleming 11/16/2005  
Acting Regional Director, Fish and Wildlife Service Date



Concur: \_\_\_\_\_ August 23, 2006  
Acting Director, Fish and Wildlife Service Date

Do Not Concur: \_\_\_\_\_  
Director, Fish and Wildlife Service Date

Date of annual review: October 2005

Conducted by: Cookeville, Tennessee Field Office